Computer Science & Engineering

B.TECH | BRANCH CODE: 105 (CSE) | SEMESTER 1 CURRICULUM

Academic Authority: Bihar Engineering University (BEU Patna) | **Branch Code:** 105 (CSE)
Interactive Dashboard: beuvault.vercel.app/syllabus →

COURSE & CREDIT STRUCTURE OVERVIEW

#	Sem	Course Code	Course Title	Category	L-T-P-C
1	Sem 1	100110	Engineering Physics	Theory	3-0-0-3
2	Sem 1	100102	Engineering Mathematics–I	Theory	3-1-0-4
3	Sem 1	100111	Programming for Problem Solving	Theory	3-0-0-3
4	Sem 1	100113	IT Workshop	Theory	2-0-0-2
5	Sem 1	100114	Basic Electronics Engineering	Theory	3-0-0-3
6	Sem 1	100115P	Swachh Bharat Mission	Lab	0-0-2-1
7	Sem 1	100110P	Engineering Physics Lab	Lab	0-0-2-1
8	Sem 1	100111P	Programming for Problem Solving Lab	Lab	0-0-2-1
9	Sem 1	100113P	IT Workshop Lab	Lab	0-0-2-1
10	Sem 1	100114P	Basic Electronics Engineering Lab	Lab	0-0-2-1

Note: Visit **beuvault.vercel.app** → to access essential BEU college & academic tools — including interactive syllabus tracking, result analytics, UGEAC directory, and coding modules.

SEMESTER 1 — COMPUTER SCIENCE & ENGINEERING DETAILED SYLLABUS

100110 — Engineering Physics L-T-P-C: 3-0-0-3

• UNIT 1.0

1. Frame of Reference [2 Hours]

Non-Inertial frame of reference, rotating coordinate system, centripetal and Coriolis acceleration and its application in weather system.

2. Oscillations [3 Hours]

Harmonic Oscillator, Damped Harmonic motion – overdamped, critically Damped and lightly damped oscillators, Force Oscillators and Resonance.

• UNIT 2.0

1. Optics [4 Hours]

Huygens's Principle, Superposition of Waves and interference of Light by wave front- splitting and amplitude-splitting; Young's double slit experiment, Michelson interferometer, Fraunhofer diffraction from single slit and circular aperture, Diffraction Grating and their resolving power

2. LASER

Einstein's theory of matter-radiations interaction, Einstein's Coefficients (A and B), Amplification by population inversion, Different types of lasers – Gas Laser, Helium-Neon Laser, Solid State Laser (Ruby, Neodymium), Semiconductor Laser.

• UNIT 3.0

1. Quantum Mechanics [5 Hours]

Compton Effect, Photoelectric Effect, Wave Particle duality, de Broglie's hypothesis, Heisenberg's Uncertainty Principle, Wave function and wave packets, phase and group velocities, Schrodinger's Wave Equation, Normalization, Expectation values, Eigenvalues and Eigenfunction.

2. Applications in One dimensions [2 Hours]

Application of Schrodinger Wave Equation for particle in one dimensional box – its wavefunction and eigenvalue of energy and momentum.

• UNIT 4.0

1. Vector Calculus [2 Hours]

Gradient, Divergence and Curl, Line, Surface and Volume integrals, Gauss's Divergence theorem and Stokes' theorem in Cartesian Coordinate.

2. Electrostatics [4 Hours]

Gauss's Law and its applications, Divergence and Curl of Electrostatic fields, Electrostatic Potential, Boundary Conditions, Poisson's and Laplace's equations, Dielectrics, Polarization, Bound Charges, Electric displacement, Boundary Conditions in dielectrics.

• UNIT 5.0

1. Magnetostatics [4 Hours]

Lorentz force, Biot-Savart and Ampere's circuital laws and their applications, Divergence and Curl of Magneto static fields, Magnetic vector potential, Force and torque on a magnetic dipole, Magnetic Materials, Magnetization, Bound currents, Boundary conditions.

2. Electrodynamics and Electromagnetic Waves

Ohm's law, Motional EMF, Faraday's Law, Lenz's law, Self and mutual inductance, Energy stored in magnetic field, Maxwell's equations in vacuum and nonconducting medium, Continuity Equation, Poynting Theorem, Wave Equations: plain electromagnetic wave in vacuum and their transverse nature and Polarization.

• UNIT 6.0

1. Introduction to Solids and Semi-Conductors [3 Hours]

Free electron theory of metal, fermi level, Bloch's theorem for particle in a periodic Potential, Kroning-Penney model and origin of energy band.

2. Electronic Materials

Metals, semiconductors and insulators, intrinsic extrinsic semiconductors,Carriertransport, diffusion and drift, P-N junction.

■ LABORATORY SYLLABUS: 100110P — Engineering Physics Lab

	Perform any 10 Experiments
Exp 1:	Determination of the capacitance and permittivity of the given material.
Exp 2:	Determination of e/m of electron.
Exp 3:	Determination of Planck's constant and Photoelectric Work Function using Photoelectric cell.
Exp 4:	Verification of inverse square law using photocell.
Exp 5:	Determination of Wavelength of (He-Ne) LASER using Diffraction Grating Method.
Exp 6:	Calculation of Energy Band Gap of a semiconductor.
Exp 7:	Determination of Dielectric constant using resonance method.
Exp 8:	Determination of Wavelength of Sodium light by measuring the diameter of the Newton's Ring.
Exp 9:	Determination of curvature of convex surface of a lens by Newton's ring.
Exp 10:	Verification of existence of Bohr's Energy level with Frank-Hertz apparatus.
Exp 11:	Determination of the Earth's horizontal magnetic field intensity and magnetic Moment of a magnet by employing magnetometer.
Exp 12:	Verification of Faraday's Law and Lenz's Law of Electromagnetic Induction.

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, R. Eisberg R.
• Resnick, Wiley India Pvt. Ltd ISBN 978-81-265-0818-1
• 2. Theory of Vibration with Application, W.T. Thomson M. D. Dahleh, Pearson India
• ISBN 978-81-317-0482-0
• 3. Introduction to Electrodynamics, D.J. Griffiths, Pearson India, ISBN 978-93-325-
• 5044-5
• 4. Electromagnetism, I.S. Grant, W. R. Phillips, Wiley India Pvt. Ltd ISBN 978-04-
• 719-2712-9
• 5. The Feynman Lectures on Physics, R.P. Feynman R. B. Leighton, Pearson India
• ISBN 978-00-710-7458-2
• 6. Optics, Ajay Ghatak ,McGraw Hill ISBN 978-93-901-1359-0
• 7. Physics of Vibration and Waves, H. J. Pain, Wiley India Pvt. Ltd, ISBN 978-04-700-
• 1296-3
• 8. Concept of Modern Physics, Arthur Beiser, McGraw Hill ISBN 978-93-513-4185-7
• 9. Introduction to Solid State Physics, C. Kittle , Wiley India Pvt. Ltd, ISBN 978-81-
• 265-7843-6

100102 — Engineering Mathematics–I L-T-P-C: 3-1-0-4

• UNIT 1.0 Linear Algebra-I [7]

Elementary Row operations, Gauss -Jordan Method for finding the inverse of Matrix,

Complex Matrix : Hermitian , Skew Hermitian and Unitary Matrix, Vector space, Sub Spaces, Linear dependence and Independences of Vectors, Linear Span, Basis, Dimension, Extension of basis of subspace, The rank of a matrix, Row and column space, Solvability of system of linear equations.

• UNIT 2.0 Linear Algebra-II [7]

Linear Transformations, Kernel and Range of linear transformation, Matrix Representation

of a linear transformation, Rank-Nullity Theorem, Eigen Value and Eigen Vectors, Properties of Eigen vectors, Eigen Bases, Orthogonal Transformation, Similarity Transformation, Matrix Diagonalization, Cayley- Hamilton Theorem.

• UNIT 3.0 Calculus for single variable [7]

Inderminate form, L'Hospital Rule, Rolle's Theorem, Mean Value Theorem, Expansion of

function (single variable), Taylor and Maclaurin Series, Riemann Integration, Riemann Sum, Improper Integrals, Beta and Gamma function and their properties.

• UNIT 4.0 Multivariable Calculus (Differentiation) [7]

Function with two or more variable, Limit, continuity and Partial differentiation, Total

Differentiation Taylor's series and Maclaurin's series for function with two variable, Jacobian, Maxima and Minima, Method of Lagrange's multiplier.

• UNIT 5.0 Multivariable Calculus (Integration) [7]

Double Integral, change of order of integration, Triple integral, Change of Variable in a

Double and Triple Integrals, Change to polar coordinate, Change to cylindrical coordinate, Change to spherical polar coordinate, Application to area and volume using double and triple integral

• UNIT 6.0 Vector Calculus [7]

Scalar and vector fields, Gradient, Directional derivative, Divergence, Curl and their

properties, Line integral, Green's theorem in plane (without proof), Surface integral, Stoke's theorem (without proof), Volume Integral, Gauss-Divergence' theorem (without proof).

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. AICTE's Prescribed Textbook: Mathematics-I (Calculus & Linear Algebra),
• ReenaGarg, Khanna Book Publishing Co. ISBN-10 9391505171
• 2. Advanced Engineering Mathematics, Chandrika Prasad &ReenaGarg;, Khanna Book
• Publishing Co., 2021. ISBN 10: 9386173522 / ISBN 13: 9789386173522.
• 3. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill New Delhi,
• 11th Reprint, 2010,ISBN-10 007063419X ISBN-13978- 0070634190.
• 4. Advanced Engineering Mathematics, SrkIyengarRk Jain,Narosa,5thEdition,ISBN-10
• 8184875606I
• SBN-13978-8184875607
• 5. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley &
• Sons, 2006.

100111 — Programming for Problem Solving L-T-P-C: 3-0-0-3

• UNIT 1.0

Introduction to Programming [6 Hours]

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

• UNIT 2.0

Operators, Conditional Branching and Loops [8 Hours]

Arithmetic expressions/arithmetic operators, relational operators, logical operators, bitwise operators and precedence.Writing and evaluation of conditionals and consequent branching, Iteration and loops.

• UNIT 3.0

Arrays and String [6 Hours]

Array declaration & initialization, bound checking arrays (1-d, 2-d), character arrays and strings.

• UNIT 4.0

Function, Recursion and Pointers [9 Hours]

Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Idea of pointers, Defining pointers, Use of Pointers in self- referential structures, idea of call by reference.

• UNIT 5.0

User defined Data Types and File handling [8 Hours]

Structure- defining, declaring, initializing; accessing structure members, processing of structure, array of structures, structures within structure, structure and function, type definition; Union— definition, declaration, accessing union members, initializing union. Introduction, file declaration, opening and closing a file, working with text and binary files, I/O operations on file, error handling, random access to files

• UNIT 6.0

Basic Algorithms [5 Hours]

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

■ LABORATORY SYLLABUS: 100111P — Programming for Problem Solving Lab

	Perform any 10 Experiments
Exp 1:	Tutorial 1: Problem solving using computers: Lab1: Familiarization with programming environment
Exp 2:	Tutorial 2: Variable types and type conversions: Lab 2: Simple computational problems using arithmetic expressions
Exp 3:	Tutorial 3: Branching and logical expressions: Lab 3: Problems involving if-then-else structures
Exp 4:	Tutorial 4: Loops, while and for loops: Lab 4: Iterative problems e.g., sum of series
Exp 5:	Tutorial 5: 1D Arrays: searching, sorting: Lab 5: 1D Array manipulation
Exp 6:	Tutorial 6: 2D arrays and Strings Lab 6: Matrix problems, String operations
Exp 7:	Tutorial 7: Functions, call by value: Lab 7: Simple functions
Exp 8:	Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration): Lab 8 and 9: Programming for solving Numerical methods problems

Exp 9:	Tutorial 10: Recursion, structure of recursive calls Lab 10: Recursive functions
Exp 10:	Tutorial 11: Pointers, structures and dynamic memory allocation Lab 11: Pointers and structures
Exp 11:	Tutorial 12: File handling: Lab 12: File operations

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. Programming in ANSI C 4th Ed,EBalagurusamy, McGraw Hill Education India
• Private Limited, ISBN-978-9339219666, 7th Edition
• 2. The C Programming Language 2e,W. Kernighan / Dennis Ritchie,Pearson Education
• India, 978-9332549449, 2nd Edition
• 3. Computer Fundamentals and Programming in C,ReemaThareja,Oxford University
• Press, ISBN- 978-9354977893, 3rd Edition

100113 — IT Workshop

L-T-P-C: 2-0-0-2

• UNIT 1.0

PC HARDWARE(6 lectures)

Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripheral. Functions of Motherboard. Assembling and Disassembling of PC. Installation of OS. Basic Linux commands.

• UNIT 2.0

INTERNET(4 lectures)

Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers.Antivirus types, Protection from various threats.

• UNIT 3.0

MICROSOFT WORD(4 lectures)

Overview of MS word features. Usage of Hyperlink, Symbols, Spell Check, Track Changes. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word. Using Word to create Project Certificate, Project Abstract, News Letter, Resume.

• UNIT 4.0

LaTeX(6 lectures)

Word Orientation: Overview of LaTeX and tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX. Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes. Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

• UNIT 5.0

MICROSOFT EXCEL(4 lectures)

Overview of Excel Features Excel formulae & Functions, conditional formatting, Charts, Hyper linking, Renaming and Inserting worksheets, Data Analysis functions. Creating a Scheduler (Features: - Gridlines, Format Cells, Summation, auto fill, Formatting) Calculating GPA (Features: - Cell Referencing, Formulae and functions in excel.

• UNIT 6.0

MICROSOFT POWER POINT(4 lectures)

Overview of PowerPoint features, Insertion of images, slide transition, Custom animation, Hyperlinks.

■ LABORATORY SYLLABUS: 100113P — IT Workshop Lab

Unit 1:	PC Hardware
Task 1:	Identify the peripherals of a computer, components in a CPU and its functions. Different types of printer.
Task 2:	Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC.
Unit 2:	Operating System Installation & Commands
Task 1:	Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
Task 2:	Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.
Task 3:	Different commands of DOS and Linux.
Unit 3:	Internet & World Wide Web
Task 1:	Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.
Task 2:	Web Browsers & Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
Task 3:	Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.
Task 4:	Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.
Unit 4:	LaTeX & Word Orientation
Task 1:	Word & LaTeX Overview: The mentor needs to give an overview of LaTeX and tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
Task 2:	Project Certificate Creation: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX.
Task 3:	Creating Project Abstract: Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4:	Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.
Unit 5:	Excel Orientation (Spreadsheet Tool)
Task 1:	Creating a Scheduler: Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text. Accessing, overview of toolbars, saving excel files, Using help and resources.
Task 2:	Calculating GPA: Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP.
Task 3:	Advanced Spreadsheet Utilities: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.
Unit 6:	PowerPoint Orientation (Presentation Tool)
Task 1:	Basic PowerPoint Utilities: Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.
Task 2:	Interactive Presentations: Hyperlinks, Inserting – Images, Clip Art, Audio, Video, Objects, Tables and Charts.
Task 3:	Master Layouts & Views: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide sorter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. The Complete Computer upgrade and repair book, Cheryl A Schmidt, 3rd edition,
• WILEY Dream tech
• 2. Introduction to Information Technology,
• ITL
• Education
• Solutions
• limited,
• Pearson Education.
• 3. PC Hardware – A, Handbook – Kate J., Chase PHI
• 4. LaTeX Beginner's Guide, Stefan Kottwitz, Packt Publishing

100114 — Basic Electronics Engineering

L-T-P-C: 3-0-0-3

• UNIT 1.0

1. Frame of Reference [2 Hours]

Non-Inertial frame of reference, rotating coordinate system, centripetal and Coriolis acceleration and its application in weather system.

2. Oscillations [3 Hours]

Harmonic Oscillator, Damped Harmonic motion – overdamped, critically Damped and lightly damped oscillators, Force Oscillators and Resonance.

• UNIT 2.0

1. Optics [4 Hours]

Huygens's Principle, Superposition of Waves and interference of Light by wave front- splitting and amplitude-splitting; Young's double slit experiment, Michelson interferometer, Fraunhofer diffraction from single slit and circular aperture, Diffraction Grating and

their resolving power

2. LASER

Einstein's theory of matter-radiations interaction, Einstein's Coefficients (A and B), Amplification by population inversion, Different types of lasers – Gas Laser, Helium-Neon Laser, Solid State Laser (Ruby, Neodymium), Semiconductor Laser.

• UNIT 3.0

1. Quantum Mechanics [5 Hours]

Compton Effect, Photoelectric Effect, Wave Particle duality, de Broglie's hypothesis, Heisenberg's Uncertainty Principle, Wave function and wave packets, phase and group velocities, Schrodinger's Wave Equation, Normalization, Expectation values, Eigenvalues and Eigenfunction.

2. Applications in One dimensions [2 Hours]

Application of Schrodinger Wave Equation for particle in one dimensional box – its wavefunction and eigenvalue of energy and momentum.

• UNIT 4.0

1. Vector Calculus [3 Hours]

Gradient, Divergence and Curl, Line, Surface and Volume integrals, Gauss's Divergence theorem and Stokes' theorem in Cartesian Coordinate.

2. Electrostatics [4 Hours]

Gauss's Law and its applications, Divergence and Curl of Electrostatic fields, Electrostatic Potential, Boundary Conditions, Poisson's and Laplace's equations, Dielectrics, Polarization, Bound Charges, Electric displacement, Boundary Conditions in dielectrics.

• UNIT 5.0

1. Magnetostatics [4 Hours]

Lorentz force, Biot-Savart and Ampere's circuital laws and their applications, Divergence and Curl of Magneto static fields, Magnetic vector potential, Force and torque on a magnetic dipole, Magnetic Materials, Magnetization, Bound currents, Boundary conditions.

2. Electrodynamics and Electromagnetic Waves [6 Hours]

Ohm's law, Motional EMF, Faraday's Law, Lenz's law, Self and mutual inductance, Energy stored in magnetic field, Maxwell's equations in vacuum and nonconducting medium, Continuity Equation, Poynting Theorem, Wave Equations: plain electromagnetic wave in vacuum and their transverse nature and Polarization.

• UNIT 6.0

1. Introduction to Solids and Semi-Conductors [3 Hours]

Free electron theory of metal, fermi level, Bloch's theorem for particle in a periodic Potential, Kroning-Penney model and origin of energy band.

2. Electronic Materials

Metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, Carrier transport, diffusion and drift, P-N junction.

■ LABORATORY SYLLABUS: 100114P — Basic Electronics Engineering Lab

Note:	Perform any 10 Experiments
Exp 1:	Study of Cathode Ray Oscilloscope (CRO) — Measurement of amplitude, time period and frequency.
Exp 2:	Identification of active and passive components.
Exp 3:	Study the characteristics of P-N junction diode under (a) Forward bias, and (b) Reverse bias.
Exp 4:	Study of clipping circuits and clamping circuits.

Exp 5:	To recognize a half-wave rectifier and full-wave rectifier using sinusoidal voltage.
Exp 6:	Study of Full wave rectifier using Capacitor filter.
Exp 7:	To recognize voltage regulator using Zener diode.
Exp 8:	Study of the input and output characterization of common base (CB) bipolar junction transistor.
Exp 9:	Study the input and output characterization of common emitter (CE) bipolar junction transistor.
Exp 10:	Study the output and transfer characteristics of JFET (Junction field effect transistor).
Exp 11:	Study of operational amplifier as (i) Inverting (ii) Non-inverting amplifier.
Exp 12:	Study of operational amplifier as (i) Integrator (ii) Differentiator.
Exp 13:	Construction and verification of logic gates (AND, OR, NOT, XOR) using (a) NOR gates (b) NAND gates.

ADDITIONAL LABORATORY COURSES

100115P — Swachh Bharat Mission (Credit: 0-0-2-1)

Objectives	
Objective 1:	Understanding the importance of cleanliness and sanitation: The course could aim to create awareness about the significance of cleanliness and sanitation in maintaining personal health, environmental sustainability, and community well-being.
	It could cover topics such as waste management, sanitation practices, and the impact of poor sanitation on public health.
Objective 2:	Developing skills for effective waste management: The course could provide training on various waste management techniques, such as waste segregation, composting, recycling, and proper disposal of hazardous waste. It could also emphasize the importance of reducing waste generation and promoting sustainable waste management practices.
Objective 3:	Promoting behavioural change towards cleanliness: The course could focus on influencing positivebehavioural change among individuals and communities towards cleanliness.
	It could include modules on promoting good hygiene practices, creating awareness about the harmful effects of littering and open defecation, and encouraging responsible waste disposal habits.
Objective 4:	Creating awareness about Swachh Bharat Mission initiatives: The course could provide information about the Swachh Bharat Mission initiatives and campaigns launched by the Government of India to promote cleanliness and sanitation, such as SwachhSurvekshan, Swachh Bharat Abhiyan, and Clean India Campaign.
	It could also discuss the progress made, challenges faced, and future prospects of the Swachh Bharat Mission.
Objective 5:	Engaging in community participation and advocacy: The course could emphasize the importance of community participation in the Swachh Bharat Mission and provide tools and strategies for engaging with local communities to promote cleanliness and sanitation.
	It could also encourage advocacy for policy changes and innovations to address sanitation-related issues at the community, regional, and national levels.
Pre-requisite:	Nil
Course Outcome	

Outcome 1:	Increased awareness and knowledge about cleanliness and sanitation: Participants of the course may gain a deeper understanding of the importance of cleanliness and sanitation, including the impact on personal health, environmental sustainability, and community wellbeing.
	They may learn about various waste management techniques, hygiene practices, and the initiatives of the Swachh Bharat Mission.
Outcome 2:	Enhanced skills for effective waste management: Participants may acquire practical skills related to waste management, such as waste segregation, composting, recycling, and proper disposal of hazardous waste.
	They may also develop skills in reducing waste generation and promoting sustainable waste management practices in their communities or workplaces.
Outcome 3:	Positive behavioral change towards cleanliness: The course may influence participants to adopt positive behavioral changes towards cleanliness, such as avoiding littering, practicing good hygiene habits, and promoting responsible waste disposal.
	Participants may develop a sense of responsibility towards maintaining cleanliness in their surroundings and actively contribute towards creating a cleaner environment.
Outcome 4:	Increased community participation and advocacy: Participants may become actively engaged in community participation and advocacy efforts related to cleanliness and sanitation.
	They may collaborate with local communities, government bodies, and nongovernmental organizations (NGOs) to raise awareness, implement cleanliness initiatives, and advocate for policy changes or innovations to address sanitation-related issues.
Outcome 5:	Contribution towards Swachh Bharat Mission objectives: Participants may contribute towards the objectives of the Swachh Bharat Mission, such as promoting cleanliness, ensuring proper waste management, and eliminating open defecation.
	They may actively participate in Swachh Bharat Mission campaigns, initiatives, and activities, and make a positive impact on their communities and society at large.
List of Reports	
Report 1:	Any topics related to Swatch Bharat Mission

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